

Hard X-Ray and Gamma-Ray Imaging System

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The Hard X-Ray and Gamma-Ray Imaging System images the Sun at high photon energies. For example, solar flares occurring in the solar corona are highly transient events involving the release of tremendous amounts of energy. This energy takes many forms, including radiation across the electromagnetic spectrum, as well as high-energy protons and electrons. Hard x rays and gamma rays are part of this release and may be thought of as simply different colors of light invisible to the eye. Those high-energy photons do not reach the Earth since they are absorbed by the atmosphere. Imaging solar flares in these colors of photons should provide additional insight into the energy release and perhaps answer long-standing questions about the role of the Sun's magnetic field in storing energy. Solar flares can be potential threats to men working in orbit and can disrupt vital communications and navigation networks here on Earth. Understanding flares is the first step toward being able to predict them.

Hard x rays and gamma rays cannot be imaged as easily as the visible colors of light. The high-energy photons zip straight through conventional lenses and mirrors without being focused. For several years, MSFC has worked in developing new technology in the area of Fourier telescopes that employ fine grids and powerful computers to measure the Fourier components associated with hard x-ray and

gamma-ray radiation. In addition, MSFC is a leader in the area of stabilized booms for space-based applications. Both of these technologies are critical to achieving an optimum, low-cost mission concept.

The hard x rays produced by the Sun are the same color as the x rays used by a dentist in looking at teeth. One potential spin-off benefit from this mission to the man on the street is in the area of nonintrusive medical imaging. This technology offers the capability of producing extremely high-resolution snapshots of the interior of the human body.

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